SEQUENCE LISTING

<110> DE CROMBRUGGHE, BENOIT
      AKIYAMA, HARUHIKO

<120> HA4, A NEW OSTEOBLAST- AND CHONDROCYTE-SPECIFIC SMALL
      SECRETED PEPTIDE, COMPOSITIONS AND METHODS OF USE

<130> UTSC:772US

<140> UNKNOWN
<141> 2005-05-06

<150> PCT/US2003/035139
<151> 2003-11-04

<150> 60/423,690
<151> 2002-11-04

<160> 3

<170> PatentIn Ver. 2.1

<210> 1
<211> 735
<212> DNA
<213> Artificial Sequence

<220>
<221> CDS
<222> (1)..(735)

<220>
<223> Description of Artificial Sequence: Synthetic
      Primer

<400> 1
```
atg cac ccc caa ggc cgc gcg gcc ccc ccg cag ctg ctg ctc ggt ctc    48
Met His Pro Gln Gly Arg Ala Ala Pro Pro Gln Leu Leu Leu Gly Leu
 1               5                  10                  15

ttc ctt gtg ctg ctg ctg ctt cag ttg tcc gca ccg tcc agc gcc tct    96
Phe Leu Val Leu Leu Leu Leu Gln Leu Ser Ala Pro Ser Ser Ala Ser
                20                  25                  30

gag aac ccc aag gtg aag caa aaa gcg ctg atc cgg cag agg gag gtg   144
Glu Asn Pro Lys Val Lys Gln Lys Ala Leu Ile Arg Gln Arg Glu Val
            35                  40                  45

gta gac ctg tat aat gga atg tgt cta caa gga cca gca gga gtt ccc   192
Val Asp Leu Tyr Asn Gly Met Cys Leu Gln Gly Pro Ala Gly Val Pro
        50                  55                  60

ggt cgt gat ggg agc cct ggg gcc aat ggc att cct ggc aca cct ggc   240
Gly Arg Asp Gly Ser Pro Gly Ala Asn Gly Ile Pro Gly Thr Pro Gly
65                  70                  75                  80

atc cca ggt cgg gat gga ttc aaa ggg gaa aag gga gaa tgc tta agg   288
Ile Pro Gly Arg Asp Gly Phe Lys Gly Glu Lys Gly Glu Cys Leu Arg
                85                  90                  95
```

```
gaa agc ttt gag gag tcc tgg acc cca aac tat aag cag tgt tcg tgg    336
Glu Ser Phe Glu Glu Ser Trp Thr Pro Asn Tyr Lys Gln Cys Ser Trp
            100                 105                 110

agt tcg ctg aac tat ggc ata gat ctt ggg aaa att gcg gag tgt aca    384
Ser Ser Leu Asn Tyr Gly Ile Asp Leu Gly Lys Ile Ala Glu Cys Thr
            115                 120                 125

ttc acg aag atg cgc tcc aac agt gct ctg cga gtt ctg ttc agt ggc    432
Phe Thr Lys Met Arg Ser Asn Ser Ala Leu Arg Val Leu Phe Ser Gly
            130                 135                 140

tca ctt cgg ctc aaa tgc agg aat gca tgc tgt cag cgc tgg tat ttt    480
Ser Leu Arg Leu Lys Cys Arg Asn Ala Cys Cys Gln Arg Trp Tyr Phe
145                 150                 155                 160

aca ttt aat gga gct gaa tgt tca gga cct ctt ccc atc gaa gcc atc    528
Thr Phe Asn Gly Ala Glu Cys Ser Gly Pro Leu Pro Ile Glu Ala Ile
                165                 170                 175

atc tat ctg gac caa gga agc cct gag tta aat tca act att aat att    576
Ile Tyr Leu Asp Gln Gly Ser Pro Glu Leu Asn Ser Thr Ile Asn Ile
            180                 185                 190

cat cgt act tcc tct gtg gaa gga ctc tgt gaa ggg att ggt gct gga    624
His Arg Thr Ser Ser Val Glu Gly Leu Cys Glu Gly Ile Gly Ala Gly
            195                 200                 205

ttg gta gat gtg gcc atc tgg gtt ggc acc tgt tca gat tac ccc aaa    672
Leu Val Asp Val Ala Ile Trp Val Gly Thr Cys Ser Asp Tyr Pro Lys
        210                 215                 220

gga gac gct tct act gga tgg aat tcc gtg tct cgc atc atc att gaa    720
Gly Asp Ala Ser Thr Gly Trp Asn Ser Val Ser Arg Ile Ile Ile Glu
225                 230                 235                 240

gaa cta ccg aaa taa                                                 735
Glu Leu Pro Lys
```

<210> 2
<211> 244
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
      Peptide

<400> 2
```
Met His Pro Gln Gly Arg Ala Ala Pro Pro Gln Leu Leu Leu Gly Leu
1               5                   10                  15
Phe Leu Val Leu Leu Leu Leu Gln Leu Ser Ala Pro Ser Ser Ala Ser
            20                  25                  30
Glu Asn Pro Lys Val Lys Gln Lys Ala Leu Ile Arg Gln Arg Glu Val
            35                  40                  45
Val Asp Leu Tyr Asn Gly Met Cys Leu Gln Gly Pro Ala Gly Val Pro
        50                  55                  60
Gly Arg Asp Gly Ser Pro Gly Ala Asn Gly Ile Pro Gly Thr Pro Gly
```

```
      65                    70                    75                    80
Ile Pro Gly Arg Asp Gly Phe Lys Gly Glu Lys Gly Glu Cys Leu Arg
                    85                    90                    95
Glu Ser Phe Glu Glu Ser Trp Thr Pro Asn Tyr Lys Gln Cys Ser Trp
                100                   105                   110
Ser Ser Leu Asn Tyr Gly Ile Asp Leu Gly Lys Ile Ala Glu Cys Thr
                115                   120                   125
Phe Thr Lys Met Arg Ser Asn Ser Ala Leu Arg Val Leu Phe Ser Gly
        130                   135                   140
Ser Leu Arg Leu Lys Cys Arg Asn Ala Cys Cys Gln Arg Trp Tyr Phe
145                   150                   155                   160
Thr Phe Asn Gly Ala Glu Cys Ser Gly Pro Leu Pro Ile Glu Ala Ile
                165                   170                   175
Ile Tyr Leu Asp Gln Gly Ser Pro Glu Leu Asn Ser Thr Ile Asn Ile
        180                   185                   190
His Arg Thr Ser Ser Val Glu Gly Leu Cys Glu Gly Ile Gly Ala Gly
        195                   200                   205
Leu Val Asp Val Ala Ile Trp Val Gly Thr Cys Ser Asp Tyr Pro Lys
        210                   215                   220
Gly Asp Ala Ser Thr Gly Trp Asn Ser Val Ser Arg Ile Ile Ile Glu
225                   230                   235                   240
Glu Leu Pro Lys


<210> 3
<211> 20138
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:   Synthetic
      Primer

<220>
<221> modified_base
<222> (265)..(18755)
<223> N = A,  C,  G or T/U

<400> 3
gaattcggat ccagacaatg agaaggtaac aatacaaagc ttcttttggg gaagtccagg 60
tactttattc agttgcaaat tagcaaggct caagctcagt ctctggcctc ctagtgggcc 120
atcttgctct attttttttct ttgtgaaaaa acacagactg aacccctacc ccagattaga 180
accggatctg gacccttca atcattagtt agtgggtcct tccattttac catggcataa 240
gaattagaag taactggatg ccagnggcaa tccgctgcag actgaccttt aatatcagtt 300
tgcaaaaaat ttagaacaaa taaggcaaag gcaagatgtg cctttggtga ctttggggga 360
tataactgcc cctgttttgt ctaaaaaggc cagaaactct ctggaagtgg aggctgtgct 420
ctaaattaac ttgctaggta attaagaatt ttagctatct acaatatgaa tctctaatat 480
tggactaaat attagaccag tccaagattg ataactggt cacactgaag aaaagagaaa 540
aatcattatg actctattaa atgactaatc ttactaagtc agattatagt ctctgatgtt 600
cttttgccat aaagttaaaa ggcttgaagc tagtccaaac tagaaaaatg gcaagcaaag 660
atgggtctaa aacatgtacc caatttagtt tcctagtcac ttcaatcagg gcactgagtc 720
aactcacctg ccagctcatc acacgaatta accatcatgc ttctatagca ttctgtggag 780
agaacctatg ttttttcccctt ccctaataag gtagcagttt aggataaaac cataagccaa 840
taagtagatc tttttaagat actataaagc atttattaaa ttctttgaca tctaaatttc 900
aaaattcaaa aataaaagta tgatttaaat agtgtgcacg ggaatgtact aaataatatg 960
cacggggata taattttcccc cttctttgtc ttttaagaag ctaaagtttt aaagtttcac 1020
aatatctagt ccttagaatt aataacttgt tgacaaaaca tctcaaatac ttgactgtat 1080
tcatgtaaca aaggcagtga ctaattgcac tttcaattgt ttttcttaag gagcagttgt 1140
aactagaaag cttgaaaagt tattaatagt cacatgtgca taatttattt atttactaga 1200
aataagagta tttatttgca gcaatttatt aagtaaaggt cctcaagaat taacactatt 1260
```

```
atgtggaaac aagtagtaac tgaggacact aagaggaaag aattatacat gcacaatttt 1320
caagaatact aaaatattat cttaaaccat aactgctttg aatatacaaa gaacaaggtt 1380
atatattcaa tctatcttat atgtacgacc tatagactgc ctgagatata aatttagcat 1440
ggcattgttt taagatgtcc aggcaatcta gaacaattta ttaaatgtct aaaaaccacc 1500
ttcttaaaag gacagcattt tttttctatg agttgtatac gcataagcaa ttgcaaattt 1560
gagaattaat agcatctgag ggacgaacaa tcttaagtaa ttgtgagctc tgagatataa 1620
cattgactat taatatacaa attaaggttt gattgttcag cattttaaaa caccatctac 1680
agcacacaac tagattatct gtgctgaaac gggggggggg gactcaaaag aataagcatg 1740
tgatctaatt cacatgtact tacatctcat ataggggttg ttttcaaaca caataattgg 1800
gatgtatgca tgtatgaatt tatagaagat acaaaagcat gtataaaaac aatttttaac 1860
ttatctttgg gatattgatt gtcaatctat ttaaaatgat ggtatgtcat aggtcaatta 1920
ttaatatttt gtaataacca aataaattgc tgtattgaac aaggaacata cacttagtca 1980
ggtttgnttt ttgttttttt gcttttttgn tttgtttntt tttttttttg gnttttcgag 2040
acagggtttc tctatagccc ttggctgtcc tggaactcac tttgtagacc aggctggcct 2100
cgaactcaga aatccacctg cctctgcctc ccgagtgctg ggatcaaagg cgtgcgccac 2160
cacgcccggc tattagtcag gtttttaaga cacaattttt ttttaaaaaa aaaatacacg 2220
aatatacatt acaattcttt attagtacca cagtggttcc aataggatgc tgaaactgta 2280
ttttgaggtg aaaaccacct caatcttggc tgcctgccct cggccttcct ctcaggcana 2340
agaggctgaa ggcancccaa tctgttgtag accanaaaac ccntgccgag tcttagtggg 2400
aaaaatatgg aggctcatgg ggcaaaggtg aacgcngccc tctcctgagt tcgctgtaaa 2460
gccacctgct ccttggcggc ctcttgtacc actatagctc tgggaaactg tgtgtctcaa 2520
ggccccaccc cacagcagcc agcagctagc tggcttcaca tgggtcaatg atcggctggg 2580
aggatgagaa aaatgacttt acaataatgt tttctcttgc caaagaattg ttttgagcac 2640
agctaatatc taattaccat tgattgtaat taataacaat tataaaagct ttctttattt 2700
tctgtaaagc cttctgtagt aaactaaaac cctaagtaat aaaaagatat tgcctctgag 2760
tcttttgggt gagagcaagg atttaaagta aacttctctt gagaggcatt agctaataaa 2820
atattttcca cttaggaaac aatatacact gaaagattaa aactcttggc ttcttgtata 2880
gaagcagaaa tgataaaaat ttctcacata atgtagatca atatttagcc atactagagg 2940
ctaaatattc cagtngttnc anactcacta gaagcaaaac ctttacaatc attaagangc 3000
aaaggagaga gaaaaagaaa caaactttca gatctataat aactatataa aaggtaggca 3060
agccagattg taatgccttg ataaattata cagtctgatt gaccctttat aaactctaaa 3120
tttgaacttt attaaaacaa catctggcta gatccgtaaa ggtgctcttt tagctaaaag 3180
aatatctcct ggtttgcaag acaaaggaaa gtcacacaaa ccgaacagaa gctgctctga 3240
gcttagttcc tcttgccatg aggacatata ttagaattac taagtttctt ttgcaccatt 3300
aactttggga aagtaaaact ccattttaaa acaatttatc actttcggaa tcaacattaa 3360
aactttacta atacattgcg aaatttggcc tgctgtgcca cgtgcttgag aagactcctg 3420
agttgccaat tttaaggcta accttctgtt accaatgtaa caattattta atcttaacca 3480
ataacttatg agctgattgt gaaaacacgc agagcacatt accaataaaa aaaatgaagc 3540
agttacactt agaccaatca gagaatatta atttttctag ctacaatcat agaataaaag 3600
cactttatca tttgccaaat acattaataa cgattgcaga gaaccctcca ggaaaaaacc 3660
atttatcagc tttttaccc caaaaccaag aggctgcaga ctctcttttt tcctataaag 3720
aacagtttct ccagcagggg ccctcctgcg gtgtgctggt ttcctggtta aagcatgtgg 3780
ccactcttgg ctttgatgaa ccaccagata aagttttta gccatcttta ttatccaaca 3840
taaaacatag aacattcatt cattctgact ggacacgaac atacatgaat tgaacatgtg 3900
aacggattgg tgcacccaaa cacaaaaaca caagagggca gagaacttct gctgtaaggc 3960
ccagagagaa caaagcagcg cacccctgaa atttctctct gcttctggga cattttcctc 4020
ccacatgatg cagtttctaa ctgtggccat ccacctgatt attaaatccc ttttattaaa 4080
ccctttcttt tctcacgcct aaaaaaagca acttcttgga gctgcggcta actgcctgat 4140
aaatttcact gctgaaacta agtgaattta gcgcgcaggt ttaacgcagt ttcaacttag 4200
cccataccaa ccttctccgg tacgaatttt ctttaattat tttcttcttc catggagctc 4260
caaaccagca atgcttcttc caaatgtcct ctgctgtttc ccagtccgc gttggttcgc 4320
caatctgttg aggccagcca gcggcccaca tgtctgggtt ctagcctggg aggtatcttg 4380
gaatctggaa gagaagaggg aactaggcgg ctcgagagag aatggaacga taatggaacc 4440
aagacatcag tctgatcaag gttcaatttt actatttgga gacactgggt tatgaagtag 4500
agggaggggc ccattcctgc caaatcatcc ttggagtcca gtttcaggtg accacgtgtt 4560
ggctccggaa cagctaggcc gcaggtagca gcagtgggag tgacaggctc cacccctgat 4620
gctctnttag ccctaacagt caaacctgat cagccagatt tcaggctggg ggggaggtta 4680
caatatttgt tggtcttttt ttcatgcagc ttttggggggg gggttgtttt gttttgtttt 4740
attgagacag gaatttgctg tgtagccttt attgtcttgg aatttgctct gtaaactagg 4800
ctgtccatga actcacagag atctacctgc ctttgcctcc ctagtgctgg ggttaaaggt 4860
gttcaccacc accacctagc ccataatctc atattctatc aagggattta ggttccataa 4920
```

```
atgcacttat cataagaggt tccaacagat ggaacacaac tacacagtat aaggtggact 4980
aatacatgtg tgtccttggt gaagaatccc ttatcttatg tcctttcatg tgcttgcttt 5040
atcaaaacat cctttcacct gtgtctgctt taggataaca ctccttcaca tgtttgccac 5100
agcaaagcac catcagacac gactgacttt ccaaagaacc cttaagtttc cacttcagat 5160
aggcatcttc ttctttaggt taagaaaatt tttttcctgt cactctgtgg aaaatatttt 5220
ctgtgcattt gacctgtgtt tcttctcctt ccttaattct tattttagat ttggtcactt 5280
cacagtgtcc cagatttcct ggatgttttg aaccaggagt tattttttaga ttgaacattt 5340
tctttgacct atgtattcat ttcttctacc atgtcttcag tgtctgagat tctctttttt 5400
aattcttgaa ttctgttggt gaagcttgcc tctgtggttg ctgttcaaat tcctatattt 5460
tcatttccat atttccctca gtttgggggtc tctttattaa ttctgttgga ggaaggggt 5520
ccaggagtca cctcacaaat cacatattcc caggattgat tgatcaggac caccggccag 5580
actcaggagc tgaactgtga tgtagagtca agatcctaca gggcttttaa agcctgagag 5640
ctataataac catctctgct aagttactcc accaatcata acttagggat agggctttct 5700
gtaggagcat gtctttgttg tgtacttatt ttgctcctat tggttagggt attcaactat 5760
ggcagaggac ttgcctcatc ttatattcat gtcttagctt gccaaccagg atatcagttt 5820
tccacataca tgtctctttc tgtcaagtag gatatcaagt tcccagggag gtcttggaaa 5880
cctaaacttt attctgcccc tactcaaaat ggaagtctta ttctaaatag gtacaggtgt 5940
ctctcttatg ttgggatcca tcccaagggc agcttaaaag gcaaatacta taaaggctga 6000
tacacaggtg cagaaagtgt tggtttctga gaacatccta gtaacagaag taacagcata 6060
tgagaaagtt tccttgtgat attaggaaca gcacaaactg gtaggttaga cgggtaacag 6120
ttaccaagac cttaacaatc ccagttcctc tttcaggtct tgagtggctg tattcctttc 6180
cttccattgt ttgtgctttc atagacttct ttaagggatt taatgttttc tttttaagga 6240
cctctagcat acacatatag gctgtgttaa ggtctttatg tgtgcttcca gggtgtaata 6300
ctcagggcct gctgtgatag ggttggtggg ttctagtgga gacctatcgt cctggctgta 6360
attggttgtg caggggtagc ctgtaggttc ccaatgagtg tgtgcctgag ctggatgctt 6420
gggaaaaaca ttgagtgacg ggaggaaagt ggggggccag ggatctgtat gcttcactga 6480
agatgggtgc agaagcagcc tagggctgag actgaggggt tccactctga gaagcagagg 6540
gagaggtgaa gatctgcagt tagcccacct gcgtccctgc ccagtgtggc ctgtgggttc 6600
ccagggagtg ccggctggag ttgggggtgg agggtaggac agggcaatga gtgggggaag 6660
ggaatttagg aggggaagat ctgtgggatc caccagcgat gaggtggctg tggtggaagc 6720
cgctgcagga gttagcgcag agctcaggat gaaactaggg attgggcgtg gaggaatgga 6780
gggagcgtgg aggtcgcctc tccctctccc tggataggta ggtcacccat ttgcttcccg 6840
tcagagagtg cctaagagag ttggaggctg ctttcctggt tgaagttgga tagaactttt 6900
caaactatat taatctgatg tgaaataagc acgtgaaagt gaacctccag cactgaatgt 6960
tggctatttt ctaccagcct cagttcacct atgaatggag actccaggct gcatcgtccc 7020
ccacaggatt gccaagaggc cacgtgaaca aagctttaca ttttggagtt tagaaggggg 7080
taacactcaa acactatcga ttatttgagt cataggactc ttatagactg ttatattctg 7140
gctctctcca tttaataccc caaatgtcac ttttttttttt ttttttaata atgagcctta 7200
gttttttagg aatgaaggaa cacgaaggtg attcctgagg ccgagttaag acacgtgcct 7260
ctaagaaact caggagttgc ggtctccatt cccccaccac caccacctgt ggtttctgac 7320
cactgtcacc ctgcctggtc tctgctttcc tctctggttc tgcagcaccc cgcggggggtc 7380
tgggcgggcg gagctgcgga ggaggggcgg gctagacccg gacccaggc ctataacagt 7440
atgcaaagct ccccggcgtc caggggggtgg gagggaaaaa ggaggccggc ctcaatgaaa 7500
ggcgcattga tgcggcgggc tgcagggctg ggccagacgc tgagcagggt caggctcctg 7560
ccgacccctt tacctcctgc tccgcgcttc gcagccaccg cacaccatgc accccaagg 7620
ccgcgcggcc cccccgcagc tgctgctcgg tctcttcctt gtgctgctgc tgcttcagtt 7680
gtccgcaccg tccagcgcct ctgagaaccc caaggtgaag caaaaagcgc tgatccggca 7740
gagggaggtg gtagacctgg taagtctgag agtcggtcct gacctcagtg ctggaagaga 7800
ggactcagcc aggatcgcac cggaagggca tcagtataga tggtggtggt gctgaccgta 7860
ggggtgagtg tagggcagca cgttaagaag cttgagtgcc tcagtgtcct gccttgtgta 7920
cctgtgtggg gacggatctg acgcacgcct gcagcagagt cttgaaccgc tacgggagat 7980
catgagaggt caccacatgc tccgacgtgg gtcaggtggg atgcccaaat ccgtgtagtc 8040
gcccagtaat ttctggctcc aggggaggcc accgttggga gaagtggggg atgctgtggc 8100
tgcaactgga gtagactgag ttagtcagtt gatttcaaaa gaaagcccga ggaagaccct 8160
aggccagctg gtcgcttggc cctgggccaa ggctgtgcaa cgtgtccttt gtgaggacca 8220
gtggccacga tctgccacgt ctgcctggag gagangctaa caacccccac aaagcatttg 8280
ttcagctaac ttgaagatta tgaatcactt tgtgtcatct ccctgggaaa tatgaactgc 8340
agtttactcc ttagaggacc acagcttgag ccaggagtgg tcagagactt tgaagctgaa 8400
ggggaaaaat gaaggcccca ctaggagccc ttccaaggac ccattttgc ctgatctgtt 8460
taaaacagat gagcagtcag gtcttaacct gtgactgcca gtcaggaaca ctgtactcaa 8520
gctaagggga aggaaagcgc ttccaggaaa gcaaatatcc caagggcttt ctgagaggct 8580
```

```
aatctgtggg aaagtctgtt tgcttaaaac ctttccctct aaaagtcaat aaacctagtg 8640
gagggcagag agtttgtctg tcccactcaa gagccagcca tcgatagatt tgtagtcttt 8700
ggcacatcat aaacttctgt ccttaaacca agctatatgg ttgtcaggca ctgcgataca 8760
taaaggacag gggacattta cttattttat tattattatt attattttag atttgaattt 8820
cttccactga cattctaagt tgagctaata aaccaagctc cttgacagct agttctaaac 8880
tgattcaaaa gcactggggg aaaatccctg ctgtttcacg cagcagtggt agggttttgt 8940
tgttttatgc tctgatatat aattttcctc cacaaaagca tactgtgttg gagctacagt 9000
tctattttga gtgcctaagt tgttaaaaaa aaaaaagtgc cacatgaatg tggctcgtgt 9060
gcagtttgcg tattatgaat gtgtagttaa gatacataaa atagtcattt ccccataaag 9120
ctagcatttt cccctctaa ggattataca gtaccacaac tctaccccaa cttggaaaag 9180
catactgtgc tgccaggctc aggtgcatcc tgtagattgg atttggttct ggtgacagaa 9240
aaagtccaca cagtcattag gaaggtttcc acagattcta taaagcgact ttgtataggc 9300
gctttcaaag cgtgtctttc acgctcccac tgaattctgc ccctggtgg ccaacacagg 9360
aaatggggcg ttgggtgagg gaatttgagc ttccattcac aggttttcat tttgttgact 9420
ttcactaatg attctaaata cctattggaa ctagcatttt aagttaagaa aagacaaaca 9480
tactctatgt agcatctttc ctgagaggaa tttagaaatt atcaaatcat actagaggaa 9540
tttacaacaa taaatgaaat gttaaagtaa aaaatttaat tggaattcat tgtgttttga 9600
aaagtctaac atcatccctg tttctatgtg aactaataca aggataagtg caggaattga 9660
taagcaacgc tcaaaatatt tccactgtag ctcaatggta gagtacttgc ctgatatgtg 9720
taaggttcta agttcaagcc tcattgatgt aatgtgaaca tgcatgctct ctctctctct 9780
ctctctctct ctgtgtgtgt gtgtgtgtgt gtgtgtgtgt gtgtgtgtgt gtgtgtgtgt 9840
gtgtgtgtgt gttttgaggt gtggtcccat gtatcccaga ctaggcacaa atttgctgtt 9900
ttgacaggat cctaaactct gggtccctgc ctctgcttcc caggggaaag ggattacagg 9960
cacacgtgtg ctaccaactg ttaacttcat ggcaagaatg cttattatca tcttcatttt 10020
atttataagg aaatgggcac tgaaatgctg agtaaatggc ctggtctcat acatctaaga 10080
cgggatgagt ctagtattta aaaaaaaaaa aaggttctag aatccacgcc tttaaattct 10140
acagcacaca gaaagaaaca acagaacaga gaacactagc gcttacagat ggtttgctag 10200
attattacac acctgctgag gacaggggat cacgtgaaac taactgggcc acagactcct 10260
cttgaggaag acagaatgga ctggagaagt tctacccact gcactttcct ctgcataaaa 10320
atgggaagag cagaggaggg gcacatccaa cttttagagat gttgcgatac aagacagcta 10380
ctgactgcta aagttttatt tcacaattat ttccctagca attatttag ggaaatcact 10440
caaaaggaaa aaaatctata tggccaagta ttctcattat attaatattt ataccaaaaa 10500
agagaaatac ccaaaaccaa gcattaaaaa tcttgtatag taatgtaaaa gttccaattt 10560
atggaaccaa gtcccttgat aaaatatggg attatgggcc tggcagtggt ggtgcatgcc 10620
tttctttaat cctagcactt gagaagcaga gagagttctg ggacagccag gggtacaagg 10680
agaaaccctg tctcttaaaa acaaaacaaa acaaaacaaa acaaaacaaa acaacaataa 10740
caacaaaccc taaaacaaac aaataaaaag aaagggattg taagaagcta acatagaatg 10800
tcaggttctg gaggagaaat tttaaacacc cttaaaatga gttcgccata ataatccatt 10860
agaacacgga cgaggtgggt tagagggact ctgccagttt attaaaaata aacgcagctg 10920
tgatcatttg actctcacat actgtttatg tattcatgac tgtatttctt tatttactta 10980
ttttgtactg gggatcaaac cttgagcatc ctgcatgcca ggcaagagtt ctaccactgg 11040
actacctccc tatgccctac actgagtctg catgttaagt aatggtactg ccccccttc 11100
tcctttgcac cgtagtataa tggaatgtgt ctacaaggac cagcaggagt tcccggtcgt 11160
gatgggagcc ctggggccaa tggcattcct ggcacacctg gcatcccagg tcgggatgga 11220
ttcaaagggg aaaagggaga atgcttaagg gaaagctttg aggagtcctg gaccccaaac 11280
tataagcagt gttcgtggag ttcgctgaac tatggcatag atcttgggaa aattgcggta 11340
agtaaagccc aaattataat aaagttgaag caaaatataa gagtttgtat aagtcattgc 11400
caaatttatt ttttattttg ttgttaaacc aaaggacctt aaattaaaag attcaggata 11460
ggtaatgtgc tgactttta cttaaaaatt aatttaaaaa aatggtaacg tttcagctaa 11520
ttttataaag gcatttctaa gatagataat cactatttta taaagcaaac gcaaaaagta 11580
tagctttttct ttttttcaaat tagacaggaa ccagtcttgt aaagtaactt taaattaatc 11640
taatacatcc tgctgtagct tcagagctaa aagtggaaga tgaacctaaa aattccacgt 11700
gactgggatc cctgctacgg gaagtccttt tgtccttggt cgccgtgctc agcttaaaac 11760
tgctgaaatt aggggaactg aagtcaatgc tagtgattta aaatagtgac gatggtgatt 11820
ctgtaatatt tgtgtaagga gaagcacgca aaatagcatg tcaggaggg cattttgatg 11880
aatgatccag ggactgttga gtggtcctgt gattagtgct ttgtctccaa gaggcccagg 11940
gtgtagctga gggggagcat gcggagcctc gtgtgcataa ggccctcggc tggatgaagt 12000
gccattggcg agtggggggg gggggagaa gagacagaac tgagaaagtc cgtgctgttt 12060
ccgtatcttc ttttgatgac cacctctgtt tctgcctcct tagctataat ttggtgcttc 12120
atggttctgc ttaccatgac cacccggaaa acagaagctt attttcataa aactctaagg 12180
ttttaagttg tagtatggcg tcatccacgt tttcatctc aacctcttct gctctatttt 12240
```

```
aaaagttcaa gaattgcctt gattctgtgt gacaggtttt tcatctagct accacatttt 12300
ggttatacac acacacacac acacacatat atatatatat attaaagaaa gtgtgatttg 12360
aatgatgact gttatttcaa catttgacaa tggtggactg ccttcttatt cacagttatt 12420
caatagaagt tgccattttc cccccaaagc tgtcccttta tggttcctgc ttttttggtt 12480
tggttttttta ttttttggtt tttggttttt tgagacaggg tttctctgtg tagccctggc 12540
tgtcctggaa ctcactttgt agaccaggct ggcctcaaac tcagaaatct gcctgcctct 12600
gcctcccgag tgctgggatt aaaggcgtgc gccaccaccg cccagcggtt cctgcattat 12660
taaaacacca tgattttttag cagtggttac caatgaatac ggaaatgttc tgcaaggaag 12720
agattgtagg tcataagcca atgtacagat tttgtgaaga ccagctagaa ggaagaaaac 12780
aaggctagct cttattactg tgctgttcag gtcatttgtc tactgtgcgc tgttgctcaa 12840
aagaaagttg agcctggtgt ggtgactcag aataaatctc agtattcagg aagtagagac 12900
cactggaaac ctctggagtt gaaggccatc cttggctaca tagctatttc aaggccatct 12960
tgggctactg gaaaccccga ctaaaacaag aacaaccaca accaccacca taaccaccac 13020
ccaaaaggat ggagagagtg aacataatcc atcccaacag atatccacca acactctagc 13080
atgccagcgc cgtgagggcg gggcttcctt tgtgtgaact tttgtatcca accgtctaac 13140
atagagttga tattcagtgt ttttcaatag aaaaaaatac ataggtttgt tagctaaaag 13200
tactgaagac tagctgtttt tgaagataaa taggaagtga aataaaacca tctaagaaag 13260
ccagaagttg gttttcttgg ctcttgtatc aatctgataa gtaatcttta tccctctata 13320
aaatttaaga atgttaaaga catgggggag aaggcaggta aaaattcaca gtgtattttc 13380
agtctcttat tttactctct cctatgccct ctccaccaat ttctcttcta tttcctcccc 13440
ctccccctcc ccctcccact tcatgtactt ccttaaaact cgaccaggtc cacttggtgc 13500
tgtctatgtg tgtctctggg aacataggga gcctctatgg gtctcatctc tggagaaaac 13560
agattttgtc tccctagcag ccatcagttg ctcacagctc cacagctagg ggtggggctc 13620
catgggctct tccccatgca tgctgggagt ttggttgatt ttgtacaggc cttgcacgtg 13680
taacctattg tgagttcata tgtgccatgg ccctgttgtg tctggcaaat tctgtttcat 13740
tgcaggtgtc tactacctca caatccccccc cgccccactc cccttgtagt ctctgaacat 13800
tgaccagatg tcgagtctct gccttaatct ccatctactg caaaaggagg gttctatgat 13860
gagggttgaa gaaatgtgtt aatttatagg tattaaaaaa gaaaccttag gggccagttt 13920
attactatgt cctttttaaca gaataatagt attactttct tctctaggac cttatgagct 13980
ggttggatat ggattttggg tccagtgaac tatagcaggc ctgagtttca ttttttttggt 14040
tgaactggct tttaacccaa tcactaaata caactattta atgacccct aacacttgag 14100
ccaccactgc actagtggca ccaccgctat cacagttcac agggtgccca gctgggtaaa 14160
acacttcatt acttttttcct tggcagcatg cactgagcct tccagcacta tgaaagttaa 14220
ccaggaaggg cgaatcttct atgtcactga cagcttaatt ttccacatcc tatgacttaa 14280
gtatgtggga ccatcagaaa taggagtatt attcagctgt aaagaaaaag gaaattatga 14340
aattcacacg taaatgggtg gaagctgaaa atattcattt cgagtgagat ccctccaaac 14400
ccaggaagac acagaacgaa gcatgttctc tctcatgcat ggacgccagc tttgaagctt 14460
tagatatgca tatttaaatt aggctatagt catagaagtt atcaagttag taaggggagg 14520
gggtacaatg caggcagtgt ggaggaggaa agggaattac cagcacaggt tagatgggag 14580
ggcaggagag gggacagtgt ctgagcacgg atatacaata ctgaagacct ttgaaaaaag 14640
cctactactg cagaagcatc ctaaactatg tacatccata tttgtaaaag gagctaaatg 14700
gtgtttccct agacatcata gactaccaag taaaaaagta ccagatatgg ggtacctctt 14760
tttgagttat tgatcagtgg agtctcaaag gcctccccaa atttcagact gtggtcatta 14820
ttatgggtta gcctccataa cttgatggtt gaagaaactt tttaatcaaa atgaaaaatg 14880
tctggctgtc ttgctgccct ggcaggagtg tacattcacg aagatgcgct ccaacagtgc 14940
tctgcgagtt ctgttcagtg gctcacttcg gctcaaatgc aggaatgcat gctgtcagcg 15000
ctggtatttt acatttaatg gagctgaatg ttcaggacct cttcccatcg aagccatcat 15060
ctatctggac caaggaagcc ctgagttaaa ttcaactatt aatattcatc gtacttcctc 15120
tggtatgtat aatagtggtg tttctgagtg agcctcaaat ctgcctaaga ggttgtttga 15180
tttccactgt cacagtgggt atctaacctg ttagaaataa acctctagct ggtccatagt 15240
cctctagctg gtctctcctc cctggactgc aattcacata attttacaga tctttttttc 15300
aaagggtata gatgctaggg tgtaatctct gatcaaggga ctcagaatct ctggtgtaag 15360
gctccagaat gtttatctta aaaacaaaat aaaacaaagc aaacaacaac aacaacagaa 15420
accgtagttg tgataatatg ccccaaaatt gaaaatcaat gataagttag aaacggcaag 15480
acagccagga attctataca gcagtggctt tggttctcag ctttggcaat acaacgggtt 15540
catctgagaa acttgaaaaa aagattcctg ccctgggtac tgctcctcca ggaagattca 15600
attaatgggg atttgatcat tacatcgttt gcattgcagt gaggctgatg gtagacccac 15660
acctgtctac agtctgttgg cttcaggctt aagtagactc atttctaggg tataaggggt 15720
caaggccttg gggacactta agtattgctg gcatgcattt tcagctagca tggtgtagac 15780
tactagacaa tttaagtggg actgtggact caccacctac ctcccactgt agaagaggtc 15840
tgggtatgct gtagccaggg agggcagagt cctttagttc tgtattcctg ggcctcagtt 15900
```

```
gaactgcatt cacttcagct aaggtggaaa cctgacaggg cacataagta cctcaaagtc 15960
aaccaggtag gaaagctaaa tagccacggc actacaatgt caagagccat tttcttcaag 16020
aatcagccac ctccagtaag gaaaggaatc gcactaagca cagacatcga aagtaatgcg 16080
actctctgcc tgtttcagtg accaaccatg aaatctttct ttagatgtga gtgaagaact 16140
ttggtaaatt ggaatgcaag atgtatgtta gaatgtgaga gcccagaggg tatgcgtagg 16200
atacagtatc aaaccaaagc agagcaaaaa gcagaacaga aaacagaaca agccaggtgt 16260
ggtggcgcac accttaaatc ccagcacttg ggaggcagag gcaggcagat ttctgagttc 16320
aaggccagcc tggtctacaa agtgagttcc aggacagcca gggctataca gagaaaccct 16380
gtctctaaaa aacaaacaaa caaacaaccc ccccccaata aacaaaaaac aaacaaacaa 16440
acaaacaaaa aaccagaaca aaatgtcctc tttaatataa tcatcctatt aaagggtcag 16500
tgaggtggct tagcaggtag aaggcactct cccaccccct cagagtctga ggacctgtgt 16560
ttgctccctg ggacccatat ggtagaagga gagaaccaac ccttgtaatc agctgtcctc 16620
taatcttcac atgtgcactg tggcacgtgt gtatccacac ctacatatac acactagata 16680
gacggtaggt aggtaggtag gtaggtaggt aggtaggtag gtaggtaggt aggtagatag 16740
gtaggtaggt aggtaggtag gtaggtaggt aggtgcatac atacatacat agatgtaatt 16800
tttttgccaa aaataagaat ctatttaaag tggattcaca gattgaaggg atggtatgag 16860
attaagctag aatttctttt tctcatatag aagtcctatc ttggatttga atagcatcta 16920
gggatccacg ttgaaaagga ctttctttaa aaagacttgc atatcttgat ccaggctctg 16980
gttcaggtct cttccaaagt tgggaagtct taaaagttgg aagtgtaggc ttcccatatg 17040
tttgggtaaa ttgttctttg gttctaagta tctagaacac gttttggttt gagagcactg 17100
cctatagcat agcaatcatg gaaatgcctc caaaaatgtc tatgtatcaa ctaaaaaaat 17160
gagaccttta ttacgaaatc atcaggtact agaatttta attagctttg cattaaacag 17220
aattataacc tgatttccta tagtaaatgc aaaattagtg gttttgcttt ttgttcttgg 17280
gttgtgactg gctctgtttt gcagtggaag gactctgtga agggattggt gctggattgg 17340
tagatgtggc catctgggtt ggcacctgtt cagattaccc caaaggagac gcttctactg 17400
gatggaattc cgtgtctcgc atcatcattg aagaactacc gaaataaagc ctctgacggt 17460
ttcagtccct gcctcgttgg cttttaaat caagcccttg agtggttcat ttaaatgaca 17520
tttaagaaat cacttaaatg aagtgctcag ctgaatgaaa aagcaaagtt aaatatgttt 17580
acagaccaaa gtgtgatctc acacttaaaa atctagtatt aaccatttta tttcagccaa 17640
agatggtttc aggattttt tttcattatt attttttaag cctatatatt ggaatgccat 17700
tacagtattt agtatttcct tctataacat ataaaggtta tgtctttgta aggactgtat 17760
agaattattt tatatctgtt aaataaaatg cttctaaaac ctaagtattt gtttattcgt 17820
ttgattgtgt agccctggct gtcttgaaat ctgcactgta gaccaggctg gcctcaaatt 17880
ccgagatctg tcaacctta tttcccatgt gctgagattg aaggtgtgca ccaccatgcc 17940
tagcaacttt attatttta aattgaagat tttgccactg aagttgaatt cctagtactt 18000
aacatatgtg aaattgaaca taaatctaaa ttttaactat tcatttagca atttatgaaa 18060
ttttagcaca tatatataac atggttctgt atcttgagat atatgaagac ataaggatgt 18120
ttatctgaca ggaatataac agtatttag gaattttgt ctccttttt ttttttattgg 18180
atattttctt tgtttatact ttaaatgttt tcccctttcc aggtctcccc ttcagaaacc 18240
cccattccat cccctgctt ctatgagggt gctcccccca cccacccact caaatcttcc 18300
tgccccaccc agcattcccc ttaaatgcca aaaacagtct tttaaaagaa cagcatttt 18360
tcttatgagt tggatatgta taaacaattt gcaaattttg agaatttctt agttctaagg 18420
angaaggaac caattttta agccaatttg ggaaagctcn tggnaaaatt actttaatcc 18480
cttnttaaaa tattncccaa atttaaangg cctttgggan ttantttcaa aacaattttt 18540
taaaaaaat aacccgggtn ttaacagggn ncaacnaaat tttaaattta ntcntggggc 18600
cctgggaaan ccnngggang gggaaaccc cnnnnnnnnn nnnnnnnnnn nnnnnnnnnn 18660
nnnnnnnnnn nnnnnnnnnn nnnnnnnnnn nnnnnnnnnn nnnnnnnnnn nnnncagtc 18720
agnctttttt tcaanaagaa agggaaatgg aagctaccaa taggtatgta tttattagag 18780
atacatctag agtctgcttt ttgtttaatt cttcaggaat tcaagacttt aagtaccctc 18840
aaagcttaca gtttntacgt tacctagcac gttttcagag agcagcacaa aggttaaaca 18900
aaccatttta catccatgtc attttgtaag tgcttgactt tgctgccaaa gtgaatacat 18960
gttatctaca gaatttttatt ttctattgaa aacagtgcct gtatcccaag gagaattagc 19020
tctgattatt cctgaactca aacatactct ttagttggtt tcttttcttt ctttttttt 19080
tttttttgat acagtggaaa taaaacaaac aaacaaacaa taacaacaca catgcatacc 19140
ttaaaataaa acagtaacaa caacaacaac acacacacac atcccttaag gtcaaaaact 19200
taaataactg ggccataaat ggatatatac tcaagtagaa tagcctctcc caaggcatgc 19260
cagccatcag tggatcccat tctggttcac acacctgctt gtgggttggc tggccccttta 19320
tgttcaaagg tgcccccatc ctgctctgcc tttccttttg ccaacctccc caacttgcac 19380
cttctcttag tctcggttac ttttcaagct ccagttcttc actttatct gccaactcca 19440
agaaagagga atgatgctcc ttcagagctt gccctctaac ttccggttct gtaattcaaa 19500
tgggattaaa gttctcagcg gcatcaacct tcaccctact gaaatagtta caggcttgat 19560
```

```
gacactcctt ttgagttgct cctgttgaac attcctgctt ctcctaagat gtagacacag 19620
ttctctggcc tacctactgt gttctctttt gaccattaaa acctcaacat gtttatagta 19680
aagctccaag agttctcaag ttctggtctc agtctttcag cttgctcttc caattatact 19740
gataactcgc tgctcataac aggccacctc tgctaccacc cgccatactt ctctccaaaa 19800
taacttcctt caagtccagc ccaccgccct tctaaaatat tgccccggtt ccttataagc 19860
tgtaagtcac catctctgat accatcaacc aggctgaagt ctctagctct tgactagata 19920
cttatcaaat atagccttgt tcccacaatt cagaacgagc tcttggtcta aatttcttac 19980
cagtctacaa tacagggtaa gaactggctt ctgtttatat taattagccc agctactgca 20040
ttgcactctt tatttggatt catttactcc atcaaagtat agcaatgtac tttaaattgt 20100
tgcattttct ggcacacact gctggtggac ataagcgg                          20138
```